FIRST HEXACTINELLID SPONGE REPORTED FROM THE UPPER TRIASSIC NAYBAND FORMATION OF CENTRAL IRAN

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INTRODUCTION

Sponges, along with scleractinian corals, are among the main reef-building organisms in Triassic reefs. Hypercalcified groups, including the chambered spinozoa, chaetetids, and spongioromorphs, represent the most abundant Triassic reef-building sponges. Earlier workers have described elements of the latter group as “hydrozoans.” Hexactinellid sponges, abundant in some Permian reefs (e.g., in Texas, Finks, 1960), are rarely known from similar Triassic deposits, in general (Tichy, 1975), and particularly from Upper Triassic stratigraphic units. Hexactinellid sponges have been sporadically reported from well-investigated Upper Triassic reefs in the western Tethyan region (e.g., Keupp et al., 1989). However, a variety of hexactinellid sponges have been reported from Upper Triassic deposits and reefal limestones of the northern and central Tethyan realm (Boiko, 1990; Wu, 1989; Wu and Xiao, 1989; Rigby et al., 1998).

Hypercalcified sponges are abundant in Upper Triassic reefs that occur within the Nayband Formation in central and northeastern Iran, along the southwestern Tethys margin. Sponges of these reefs have been described by Senowbari-Daryan et al. (1997), Senowbari-Daryan and Hamedani (1999), and Senowbari-Daryan (2003, 2005a, 2005b). In addition to the hypercalcified sponges, both chambered and unchambered hexactinellid sponges also occur, but are less abundant in these Upper Triassic reefs in Iran. Here, we report the first, and the largest known hexactinellid sponge from the Nayband Formation. It was collected from exposures approximately 50 km south of the town of Delijan, in central Iran.

The Upper Triassic (Norian-Rhaetian) siliciclastic-carbonate deposits of the Nayband Formation reach a thickness of about 3,000 m at the type locality at Kuh-e Naybandan, south of Tabas (see Fürsich et al., 2005). The formation is an important stratigraphic unit exposed in several localities in central and northeastern Iran. General information about the Triassic deposits in Iran was published by Seyed-Emami (2003). Detailed investigations of the Nayband Formation at the type locality were carried out by Fürsich et al. (2005).

The sponge described in this paper was collected from the siliciclastic-carbonate beds between the dome-shaped reefs, exposed along the right side of the highway from Delijan to Esfahan, approximately 50 km south of the town of Delijan (geological map of Golpaygan, N. E7, 1:250,000, completed by Thiele et al., 1968). This locality has also yielded a variety of hypercalcified sponges described earlier by Senowbari-Daryan et al. (1997) and Senowbari-Daryan (2005a, 2005b). In addition to hypercalcified sponges, a variety of chambered and nonchambered hexactinellid sponges were collected from this locality. In contrast to other localities, where hexactinellid sponges occur only sporadically, the locality south of Delijan has produced a moderately diverse hexactinellid sponge fauna (Senowbari-Daryan, 2005b).

Repository.—The holotype, and only known specimen of the species, is deposited in collections in the Institute of Paleontology, University Erlangen-Nürnberg, Material: “Senowbari-Daryan, Hexactinellid, Triassic, Iran.”

SYSTEMATIC PALEONTOLOGY

Phylum Porifera Grant, 1836
Class Hexactinellida Schmidt, 1870
Order Amphidiscosida Schrammen, 1924
Family Pelicaspongidae Rigby, 1970


Diagnosis.—“Thick-walled, vaseform sponges with circular, parietal openings or well-defined canal system; skeleton with specialized gastral or dermal layer, or both, of large simple hypodermal and hypogastral hexactines whose gastric or tangential rays appear unoriented with reference to one another but whose proximal and distal rays are arranged approximately normal to surface; interior spicules unoriented, smaller hexactines and related forms” (Finks and Rigby, 2004, p. 321).

Genus Naybandospongia new genus

Type species.—Naybandospongia gigantia n. sp.

Diagnosis.—Large, steeply obconical hexactinellid sponge with deep axial spongocoel and thick wall with prominent, relatively large, irregularly placed, straight radial exhalant canals in inner wall, connected to smaller diameter, radial inhalant canals in the outer wall; skeleton of several sizes of irregularly oriented and placed hexactine and hexactine-based spicules; dermal and gastric layers present, but ill-defined, of somewhat coarser spicules and more abundant and closely packed hexactines and hexactine-based spicules than in interior of skeleton; gastric layer less distinct than dermal layer.

Etymology.—Nayband: named for the occurrence of the holotype in the Nayband Formation; spongiosa, sponge.

Occurrence.—Upper Triassic Nayband Formation, roadside outcrops along the Delijan to Esfahan highway, 50 km south of Delijan, in central Iran at (latitude and longitude).

Discussion.—Several bowl- to sack-shaped sponges are included in the Pelicaspongidae. Ascposponsiella Garcia-Bellido Capdevilla and Rigby (2004), from the Carboniferous of Spain, is a moderately large, sack-shaped sponge with a deep, open spongocoel and walls that are composed of irregularly oriented hexactines of several sizes. The thick walls are perforated with straight, radial coarse canals or parietal gaps that are cross-connected with smaller canals, however, and it has a distinct, but locally developed, gastric layer of enlarged hexactines, unlike the more obscure gastric layer in the present genus, and Ascposponsiella lacks a differentiated dermal layer.

Several somewhat similar bowl-shaped sponges occur in the family, including Pelicaspongia from the Devonian of Canada. It has a skeleton of irregularly oriented hexactines, with enlarged dermal and gastric spicules, and numerous large cylindrical canals that open on both the dermal and gastric surfaces, in a pattern unlike that in the Iranian sponge described here. Vauerealisporgia Rigby (1974), from the Orдовician of Canada, is another bowl-shaped sponge with a skeleton of irregularly oriented hexactines but it also has numerous canals or parietal gaps that open on the dermal surface. Keriagastospongia Wu, 1989, from the Triassic of China, is also bowl-shaped, but it has a shallow spongocoel marked by rings of coarse ostia and a coarser-textured dermal layer of more consistently oriented hexactines.